

Altitude Compensating Nozzle Transonic Performance Flight Demonstration, Phase I

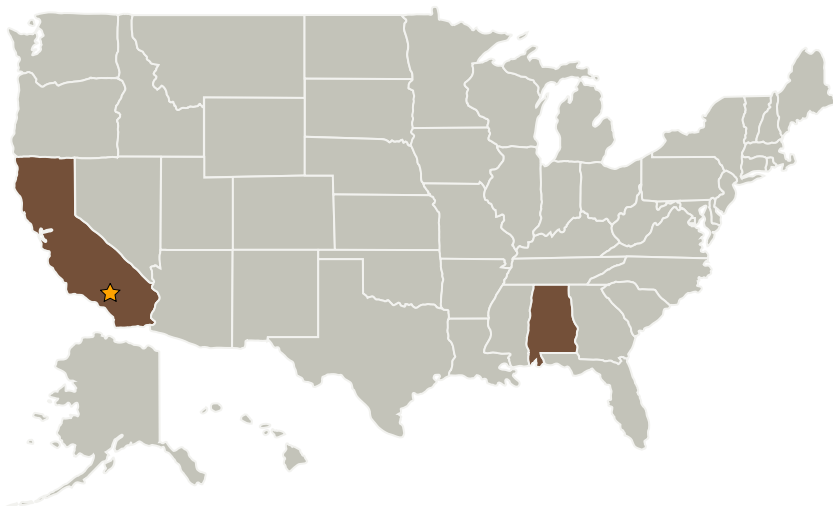
Completed Technology Project (2004 - 2004)



Project Introduction

Altitude compensating nozzles continue to be of interest for use on future launch vehicle boosters and upper stages because of their higher mission average Isp and superior packaging efficiency compared with conventional bell nozzle designs. The plume physics and performance of altitude compensating nozzles have been characterized through extensive cold gas wind tunnel testing, limited hot gas testing, and computational fluid dynamic modeling. However, no altitude compensating nozzle has ever been validated in flight. Questions remain regarding performance through the critical transonic regime (Mach 0.6-1.5) where a high degree of interaction is expected between the external flow around the vehicle and the hot gas plume. A Phase I study is proposed to establish feasibility of validating transonic performance for an altitude compensating nozzle using the NASA F15B Propulsion Flight Test Fixture. Under this Phase I program we will derive requirements for the test, develop preliminary designs for the flight test article, establish test plans and procedures, coordinate closely with the NASA Dryden Flight Research Center to assure experiment safety and seamless integration with the F15B/PFTF, finalize plans for Phase II, and document our results. Test article fabrication, integration, and testing will be performed during a subsequent Phase II effort.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

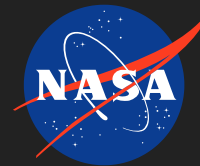
Armstrong Flight Research
Center (AFRC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
K T Engineering Corporation	Supporting Organization	Industry	Madison, Alabama

Primary U.S. Work Locations	
Alabama	California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Richard J Denton

Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.2 Electric Space Propulsion
 - └ TX01.2.4 Electrothermal